

**WE CLAIM**

1. A diffuser arrangement for an engine, the diffuser  
5 arrangement comprising a wall surface in a fluid flow conduit  
formed with an aperture between an upstream part of the wall  
surface and a downstream part of the wall surface, the  
arrangement wherein the downstream part having a step  
displacement away from a projected profile of the upstream  
10 part of the wall surface whereby in use flow momentum in a  
fluid flow past the wall surface facilitates flow bleed into  
the aperture.
2. An arrangement as claimed in claim 1 wherein the  
upstream part has a leading edge to the aperture shaped to  
15 enhance flow momentum thereabout towards the aperture.
3. An arrangement as claimed in claim 2 wherein the leading  
edge is curved into the aperture.
4. An arrangement as claimed in claim 3 wherein the leading  
edge has a curvature dependent upon expected flow rate and/or  
20 cross-section of the conduit including the wall surface.
5. An arrangement as claimed in claim 3 wherein the leading  
edge will have a radius in the order of 0.05 to 0.15 of a  
conduit inlet passage height.
6. Apparatus as claimed in claim 5 wherein the leading edge  
25 has a radius in the order of 0.09 to 0.11 of the conduit  
inlet passage height.
7. An arrangement as claimed in claim 1 wherein the  
downstream part has a trailing edge to the aperture which is  
substantially angularly presented.
- 30 8. An arrangement as claimed in claim 1 wherein the  
downstream part is at an angle up to 35° to the principal  
axis of fluid flow in the conduit.

9. Apparatus as claimed in claim 8 wherein the angle is  $30^\circ$  to the principal axis of fluid flow in the conduit.
10. An arrangement as claimed in claim 1 wherein the step displacement of the downstream part relative to the upstream  
5 part is in the order of 0.05 to 0.12 of the conduit radius or half the conduit cross-sectional width.
11. Apparatus as claimed in claim 10 wherein the step displacement is in the order of .06 to 0.1 of the conduit radius or half the conduit cross-sectional width.
- 10 12. An arrangement as claimed in claim 1 wherein the aperture is divergent away from an opening in the wall surface.
13. An arrangement as claimed in claim 1 wherein the aperture has a width at the wall surface in the order of 0.04  
15 to 0.07 of the conduit radius or half the conduit cross-sectional width.
14. An arrangement as claimed in claim 13 wherein the width is in the order of 0.05 to 0.06 of the conduit radius or half the conduit cross-sectional width.
- 20 15. An arrangement as claimed in claim 1 wherein the aperture has an aperture wall upon the side towards the downstream part which is substantially perpendicular to the principal axis of fluid flow in the conduit.
16. An arrangement as claimed in claim 1 wherein the  
25 combined length of the wall surface is three to four times a conduit inlet passage height.
17. An arrangement as claimed in claim 1 wherein the aperture is coupled to a cooling system of an engine.
18. An arrangement as claimed in claim 1 wherein the  
30 downstream part is shaped so to create a barrier or gate which causes in use a vortex below that barrier or gate for fluid flow control through the arrangement.

19. An engine incorporating a diffuser arrangement as claimed in any preceding claim.